

Remembering the Order of Events in Unique Experiences

A fundamental feature of episodic memory is the ability to remember the order of events in unique experiences. In previous research, Howard Eichenbaum and his colleagues at Boston University's Center for Memory and Brain found that the hippocampus is critical to this ability, showing that damage to the hippocampus results in a severe impairment in the ability of rats to remember novel sequences of odors. In a new study funded by the NSF Center of Excellence for Learning in Education, Science, and Technology (CELEST), Eichenbaum and colleagues recorded simultaneously from many cells in the hippocampus as rats sampled unique odor sequences and then were tested for memory for the order of odor presentations. Ensembles of neurons in the hippocampus encoded both where and when odors were sampled and the hippocampal representation of a gradually changing temporal signal is especially important for successfully remembering the order in which events occurred within an episode. These findings, in combination with evidence for the representation of the odors themselves, suggests that memory was successful when the odor stimuli are bound in a sequence by association with their temporal context. This work was published in the journal *Neuron* in 2007.